

JC14 Rec'd PCT/PTO 13 JUL 2005

1 TITLE

2 Apparatus, Method, and Article of Manufacture for Visualizing Status in a3 Compute Environment

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5 INVENTOR

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8 CROSS REFERENCE TO RELATED APPLICATION(S)/CLAIM OF

9 PRIORITY

10 This application claims the benefit of priority of US Application No,

11 60/439,696, filed January 13, 2003, which is incorporated in its entirety herein.

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13 STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR

14 DEVELOPMENT

15 Not applicable.

16

17 REFERENCE OF AN APPENDIX

18 Not applicable.

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20 FIELD OF THE INVENTION

1       The present invention relates generally to compute and/or network  
2       management and more particularly to an improved system, method, apparatus, and  
3       article of manufacture for graphically reporting status on a compute infrastructure.

4

5       BACKGROUND OF THE INVENTION

6           Heretofore, compute infrastructure status visualization techniques involve  
7       the use of multiple and various applications that are generally specialized, large  
8       and complex, all monopolizing desktop resources and usually requiring special  
9       training. Determining status on important metrics such as business, application,  
10      and technology or production issues involves interaction with one or more of  
11      these complex applications, multiple key strokes and complex application  
12      interaction to generate reports, which are then consolidated from multiple sources  
13      and summarized for management. The process is often time-consuming and  
14      cumbersome and requires special training and skills. Furthermore, the existing  
15      applications are geared for proficient computer or network operators, not  
16      managers. Because of time constraints, busy managers generally do not have  
17      time to even review the summary reports.

18           Accordingly, what is needed is a further summary of the summary report.  
19       That is, a comprehensive way to visualize status on a compute infrastructure, and  
20       more particularly, a simple solution that detects status from multiple sources or

1      metrics, consolidates them, summarizes what it consolidated and displays the  
2      entire status as a single icon on a manager's display device - desktop, from which  
3      the underlying detail can be displayed via drilldown. The drilldown should  
4      include certain critical information, so that managers can take appropriate action  
5      when necessary.

6

7      **SUMMARY OF THE INVENTION.**

8            The present solution addresses the aforementioned problems of the prior  
9      art by providing for, among other things, an improved apparatus, method and  
10     article of manufacture for visualizing status of important metrics. Specifically,  
11     there is provided herein an exemplary technique utilizing at least one status icon  
12     for visually reporting the status of at least the important metrics of a resource, e.g.,  
13     one or more applications running within a compute infrastructure. In an  
14     exemplary embodiment, the application status icon is located on a device display,  
15     preferably as part of a graphical user interface icon tray, such as Microsoft®  
16     Windows® system tray. To generate the appropriate color of the application  
17     status icon, several predefined tests or database queries are executed to determine  
18     the status of a desired application. Thereafter, the determined status is compared  
19     to a plurality of threshold conditions, which determine the state of a given status  
20     metric and contribute to the overall color of the application status icon, preferably

1 located on the display device. Thus, a user or manager need not run an  
2 application to check its status. Instead, the manager need only view the color of  
3 the application status icon on the display device to determine the overall health of  
4 a plurality of underlying metrics, which contribute to the creation of the  
5 application status icon's color.

6 If a problem exists with any metric color of the single main application,  
7 the icon changes from good to bad. A problem is defined as one or more metrics  
8 falling outside the range of a predefined and acceptable threshold condition. Upon  
9 drilldown, the color of the icon used to present the metric is also changed from  
10 good to bad.

11

## 12 BRIEF DESCRIPTION OF THE DRAWINGS

13 Referring briefly to the drawings, embodiments of the present invention  
14 will be described with reference to the accompanying drawings in which Figures  
15 1, 2 and 3 illustrate certain aspects and features of the present solution.

16

## 17 DETAILED DESCRIPTION OF THE INVENTION

18 Referring more specifically to the drawings, for illustrative purposes the  
19 present invention may be embodied in the graphical image/interface, method of  
20 operation and article of manufacture or product, generally shown in Figures 1, 2

1 and 3. It will be appreciated that the graphical image/interface, method of  
2 operation and article of manufacture may vary as to the details of its representative.  
3 icons (a square may be a circle), configuration (the exact screen layout may be  
4 adjusted) and operation without departing from the basic concepts disclosed  
.5 herein. The following description, which follows with reference to certain  
6 embodiments herein, is, therefore, not to be taken in a limiting sense.

7 There is provided herein an exemplary method utilizing at least one status  
8 icon for visually reporting the status of at least the important metrics of a resource,  
9 e.g., one or more applications running within a compute infrastructure. The status  
10 icon also implements a real time summary drill-down status report of the resource,  
11 e.g. an application. In an exemplary embodiment, the status icon is located on a  
12 device display, preferably as part of a graphical user interface icon tray, such as  
13 Microsoft® Windows® system tray.

14 Figure 1 depicts the status icon as part of the Microsoft® Windows®  
15 system tray. The icon can be programmed to summarize the state of multiple  
16 metrics over various time intervals. For example, at Time 1, 2 and 3, the status  
17 icon is red, reflecting a bad state. At Time 4, the status icon is green, reflecting a  
18 good state. Preferably, a single graphical icon is utilized to summarize the state of  
19 the underlying metrics within a compute infrastructure. Thus, if the icon is green,  
20 thus indicating a good state, management can be assured that the important

1      metrics of the given resource(s) are good. Alternatively, if the icon is red, thus  
2      indicating a bad state, management can take action with the appropriate people.

3                 Figure 2 depicts the first level of drilldown for taking action when the icon  
4      is red, thus indicating a bad state. The first level of drilldown for taking action is  
5      the main status window/object (hereinafter referred to as application main status  
6      screen). The application main status screen is accessed and displayed when the  
7      user selects/clicks on the status icon. Each metric icon displayed in the  
8      application main status screen, represents a single metric or a container of  
9      multiple metrics. The states of the metrics contribute collectively to the overall  
10     state reported by the status icon. A single metric might also be associated with a  
11     test or query that can aggregate multiple “hidden” metrics and summarize the  
12     results into a single value (e.g. Service Levels).

13                Figure 2 also depicts the various resources/applications running on the  
14     computing device. Many of these applications are also depicted in the system tray  
15     together with the status icon. Using the system tray elevates the executive level  
16     attention for metrics contained in this application, constantly reporting their status  
17     in real time. This allows the status for important issues, reflected in the state of  
18     important metrics to be elevated above the “noise” of the other applications on the  
19     busy display device.

1           Also shown in Figure 2, prior use of the system tray uses single icons to  
2       represent the state of single applications (e.g. NetMeeting) or monitors (e.g. CPU  
3       Usage). This invention uses a single icon to represent the state of multiple and  
4       dissimilar metrics from multiple and dissimilar sources, presented and  
5       summarized to management as a single icon. This makes better use of the system  
6       tray, leveraging the fact that the system tray is always visible, to allow important  
7       metrics to also always be visible to management.

8           Figure 3 depicts self explanatory details that are used to manage metrics.  
9       Not illustrated, but disclosed is the graphing of historical metric data in a variety  
10      of formats (e.g. line, bar, pie) charts.

11          In accordance with another aspect of the present invention, there is  
12       provided an exemplary system, method, apparatus and product for visualizing  
13       status on a compute infrastructure wherein an application is used as a container  
14       for important metrics to be managed by an application.

15          In accordance with another aspect of the present invention, there is  
16       provided an exemplary system, method, apparatus and product for visualizing  
17       status on a compute infrastructure wherein a main status icon for the application is  
18       provided on a display device associated with a device running Microsoft's  
19       Windows-based operating system. The icon is preferably displayed as part of the

1 Windows System Tray and may also be positioned ahead of other icons in the  
2 System Tray.

3 In accordance with another aspect of the present invention, there is  
4 provided an exemplary system, method, apparatus and product for visualizing  
5 status on a compute infrastructure wherein the main status icon is an iconized  
6 (minimized) Windows application, or any application in a windowing  
7 environment (e.g. X Windows).

8 In accordance with another aspect of the present invention, there is  
9 provided an exemplary system, method, apparatus and product for visualizing  
10 status on a compute infrastructure wherein the color of the main status icon  
11 changes to reflect the underlying state of important metrics associated with the  
12 application.

13 In accordance with another aspect of the present invention, there is  
14 provided an exemplary system, method, apparatus and product for visualizing  
15 status on a compute infrastructure wherein the metrics are configurable.

16 In accordance with another aspect of the present invention, there is  
17 provided an exemplary system, method, apparatus and product for visualizing  
18 status on a compute infrastructure wherein the conditions that trigger the changed  
19 state of a metric are configurable.

1           In accordance with another aspect of the present invention, there is  
2       provided an exemplary system, method, apparatus and product for visualizing  
3       status on a compute infrastructure wherein the application can manage other  
4       instances of itself, as a container of metrics or other instances of the application.

5       In accordance with another aspect of the present invention, there is provided an  
6       exemplary system, method, apparatus and product for visualizing status on a  
7       compute infrastructure wherein the specific colors of the main icon represent  
8       multiple levels of severity conditions.

9           In accordance with another aspect of the present invention, there is  
10       provided an exemplary system, method, apparatus and product for visualizing  
11       status on a compute infrastructure wherein the specific shape or image of the main  
12       icon represent multiple levels of severity conditions.

13           In accordance with another aspect of the present invention, there is  
14       provided an exemplary system, method, apparatus and product for visualizing  
15       status on a compute infrastructure wherein ignored metrics do not contribute to  
16       the color of the main icon.

17           In accordance with another aspect of the present invention, there is  
18       provided an exemplary system, method, apparatus and product for visualizing  
19       status on a compute infrastructure wherein the metrics can be ignored based upon  
20       time (such as a snooze alarm)

1           In accordance with another aspect of the present invention, there is  
2       provided an exemplary system, method, apparatus and product for visualizing  
3       status on a compute infrastructure wherein the main icons are modifiable and  
4       animated.

5           In accordance with another aspect of the present invention, there is  
6       provided an exemplary system, method, apparatus and product for visualizing  
7       status on a compute infrastructure wherein a click (or drilldown) on the icon  
8       shows at least one list of icons that contain either at least one metric, or at least  
9       one icon representing another instance of the application (which may be reflecting  
10      more applications or more metrics).

11          In accordance with another aspect of the present invention, there is  
12       provided an exemplary system, method, apparatus and product for visualizing  
13       status on a compute infrastructure wherein individual metrics are populated as a  
14       result of running tests on a compute infrastructure.

15          In accordance with another aspect of the present invention, there is  
16       provided an exemplary system, method, apparatus and product for visualizing  
17       status on a compute infrastructure wherein a single test can aggregate the results  
18       of multiple important things, into a metric of higher importance (e.g. Service  
19       Level Compliance).

1            In accordance with another aspect of the present invention, there is  
2        provided an exemplary system, method, apparatus and product for visualizing  
3        status on a compute infrastructure wherein individual metrics are the result of  
4        queries to a predefined dynamic updatable database.

5            In accordance with another aspect of the present invention, there is  
6        provided an exemplary system, method, apparatus and product for visualizing  
7        status on a compute infrastructure wherein the display name of the test, as viewed  
8        by the user, can be different from the actual test name as required to gather  
9        information.

10          In accordance with another aspect of the present invention, there is  
11        provided an exemplary system, method, apparatus and product for visualizing  
12        status on a compute infrastructure wherein the details describing the test and  
13        thresholds are configurable.

14          In accordance with another aspect of the present invention, there is  
15        provided an exemplary system, method, apparatus and product for visualizing  
16        status on a compute infrastructure wherein the contact information including but  
17        not limited to a business owner and the a trouble ticket assignee is displayable.

18          In accordance with another aspect of the present invention, there is  
19        provided an exemplary system, method, apparatus and product for visualizing

1 status on a compute infrastructure wherein an Alert, Alarm or Fault is associated  
2 with each metric, coming from one of many trouble ticket systems.

3 In accordance with another aspect of the present invention, there is  
4 provided an exemplary system, method, apparatus and product for visualizing  
5 status on a compute infrastructure wherein the status of the Alert, Alarm or Fault  
6 is tracked, including but not limited to Alert Level, Priority, Creation Data, Ticket  
7 Number, Assignee.

8 In accordance with another aspect of the present invention, there is  
9 provided an exemplary system, method, apparatus and product for visualizing  
10 status on a compute infrastructure wherein the historical performance of the  
11 metric can be observed.

12 In accordance with another aspect of the present invention, there is  
13 provided an exemplary system, method, apparatus and product for visualizing  
14 status on a compute infrastructure wherein multiple levels of historical  
15 performance can be observed (e.g. hourly, weekly, monthly).

16 In accordance with another aspect of the present invention, there is  
17 provided an exemplary method of visualizing status on a compute infrastructure.  
18 wherein the method can be employed or embedded within any application, as a  
19 means to report status within the application, for any metrics that is internal and/or  
20 external to the application.

1           In accordance with another aspect of the present invention, there is  
2       provided an exemplary system, method, apparatus and product for visualizing  
3       status on a compute infrastructure wherein the main status icon can be located  
4       anywhere on the display device.

5           In accordance with another aspect of the present invention, there is  
6       provided an exemplary system, method, apparatus and product for visualizing  
7       status on a compute infrastructure wherein the status icon need not be graphical  
8       but can also consist of text, video, audio or a combination thereof.

9

10      CONCLUSION

11           Having now described an exemplary of the invention, it should be  
12       apparent to those skilled in the art that the foregoing is illustrative only and not  
13       limiting, having been presented by way of example only. All the features  
14       disclosed in this specification (including any accompanying claims, abstract, and  
15       drawings) may be replaced by alternative features serving the same purpose, and  
16       equivalents or similar purpose, unless expressly stated otherwise. Therefore,  
17       numerous other embodiments of the modifications thereof are contemplated as  
18       falling within the scope of the present invention as defined by the appended  
19       claims and equivalents thereto.

20           Moreover, the techniques may be implemented in hardware or software, or

1        a combination of the two. In one embodiment, the techniques are implemented in  
2        computer programs executing on programmable computers that each include a  
3        processor, a storage medium readable by the processor (including volatile and  
4        non-volatile memory and/or storage elements), at least one input device and one  
5        or more output devices. Program code is applied to data entered using the input  
6        device to perform the functions described and to generate output information.  
7        The output information is applied to one or more output devices.

8

9            Each program is preferably implemented in a high level procedural or  
10      object oriented programming language to communicate with a computer system,  
11      however, the programs can be implemented in assembly or machine language, if  
12      desired. In any case, the language may be a compiled or interpreted language.

13            Each such computer program is preferably stored on a storage medium or  
14      device (e.g., CD-ROM, hard disk or magnetic diskette) that is readable by a  
15      general or special purpose programmable computer for configuring and operating  
16      the computer when the storage medium or device is read by the computer to  
17      perform the procedures described in this document. The system may also be  
18      considered to be implemented as a computer-readable storage medium, configured  
19      with a computer program, where the storage medium so configured causes a  
20      computer to operate in a specific and predefined manner.